



Low cost transportable device for transference of atmosphere sensitive materials from glove box to SEM

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Low cost transportable device for transference of atmosphere sensitive materials from glove box to SEM

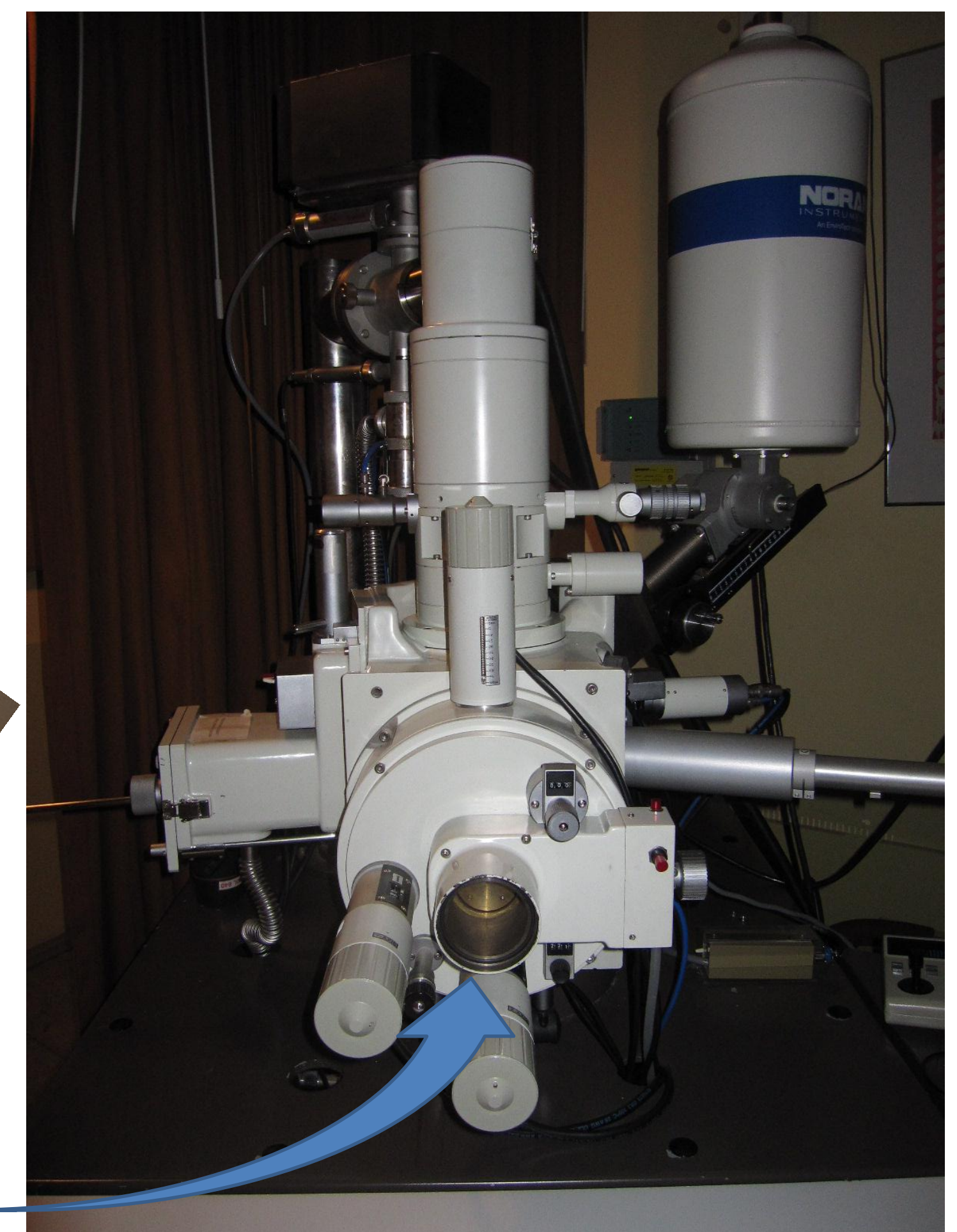
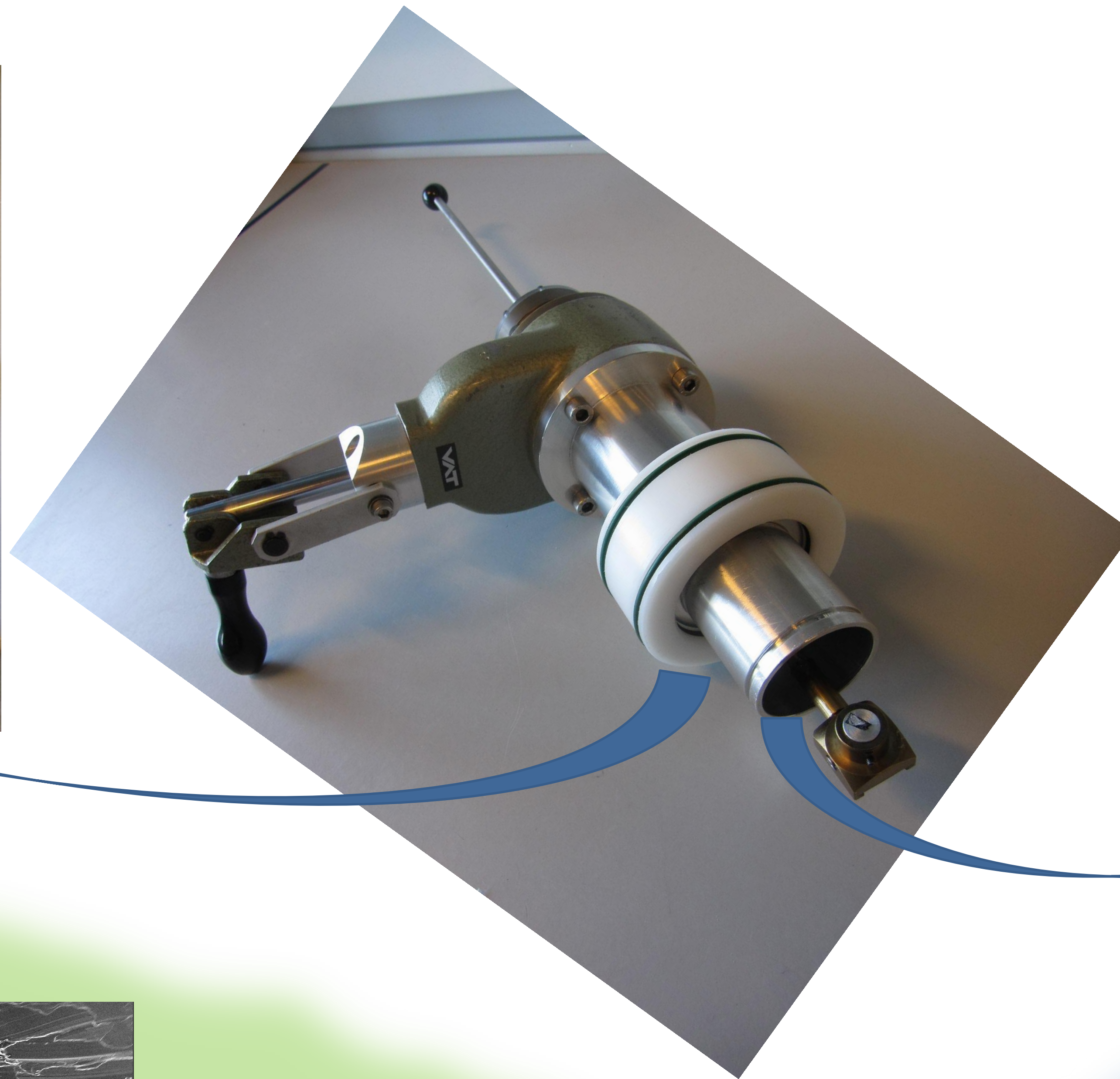
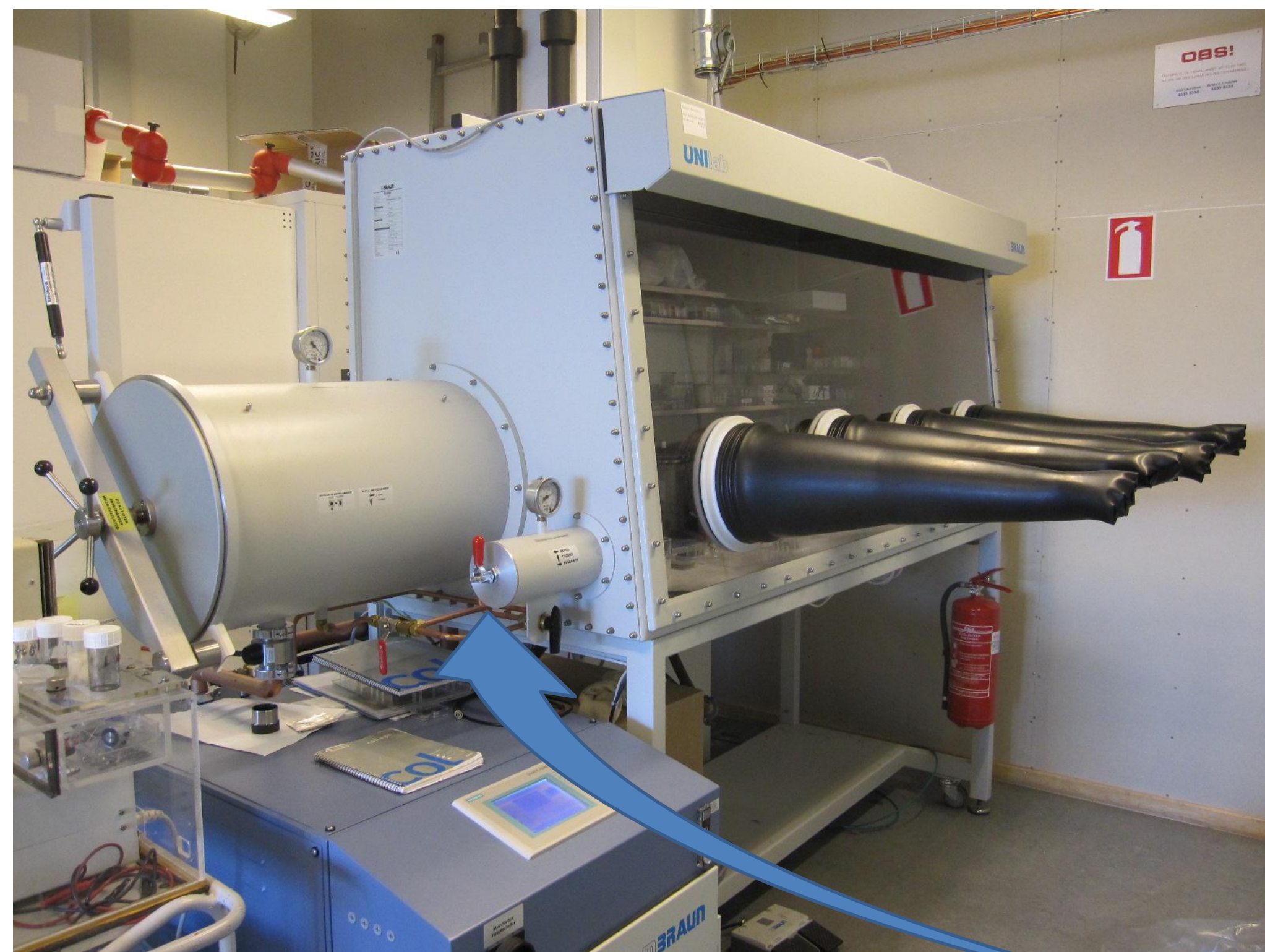
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Introduction

Moisture or air sensitive materials are often encountered within several highly important fields such as catalyst R&D, pharmaceutical R&D, and battery R&D. Essential to all materials research and development is microstructure characterization, which often implies electron microscopy. Entering the field of high energy battery research involving highly reactive metals, e.g. lithium, we needed a means of transferring atmosphere sensitive materials

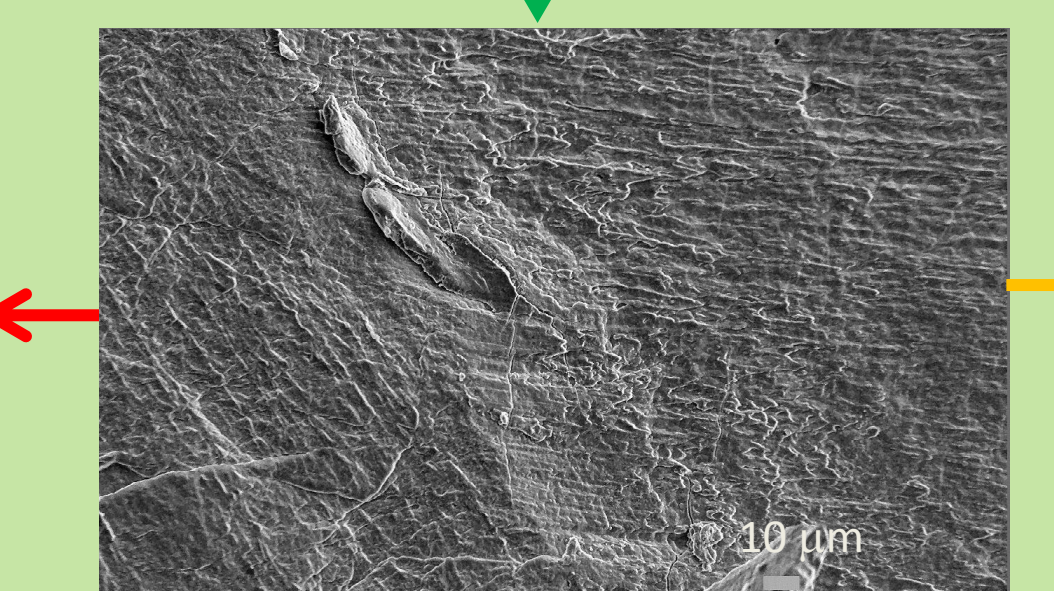
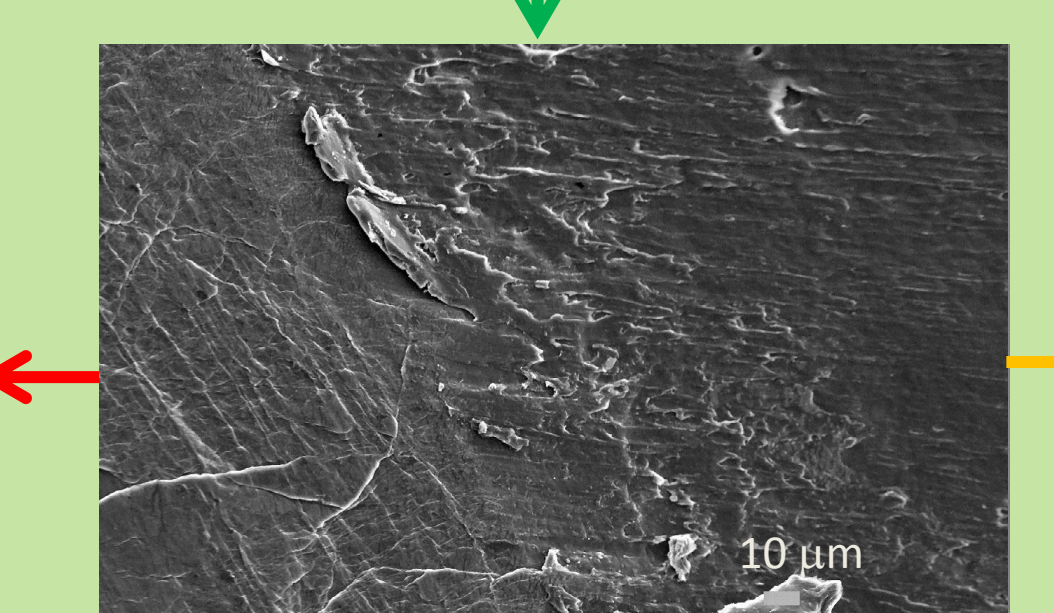
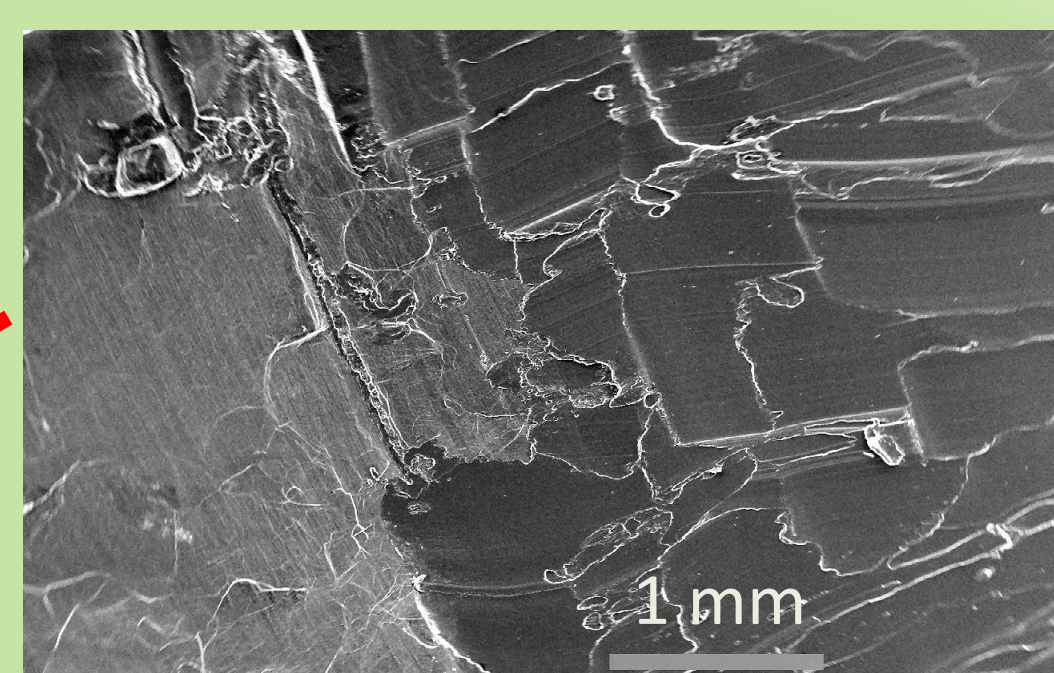
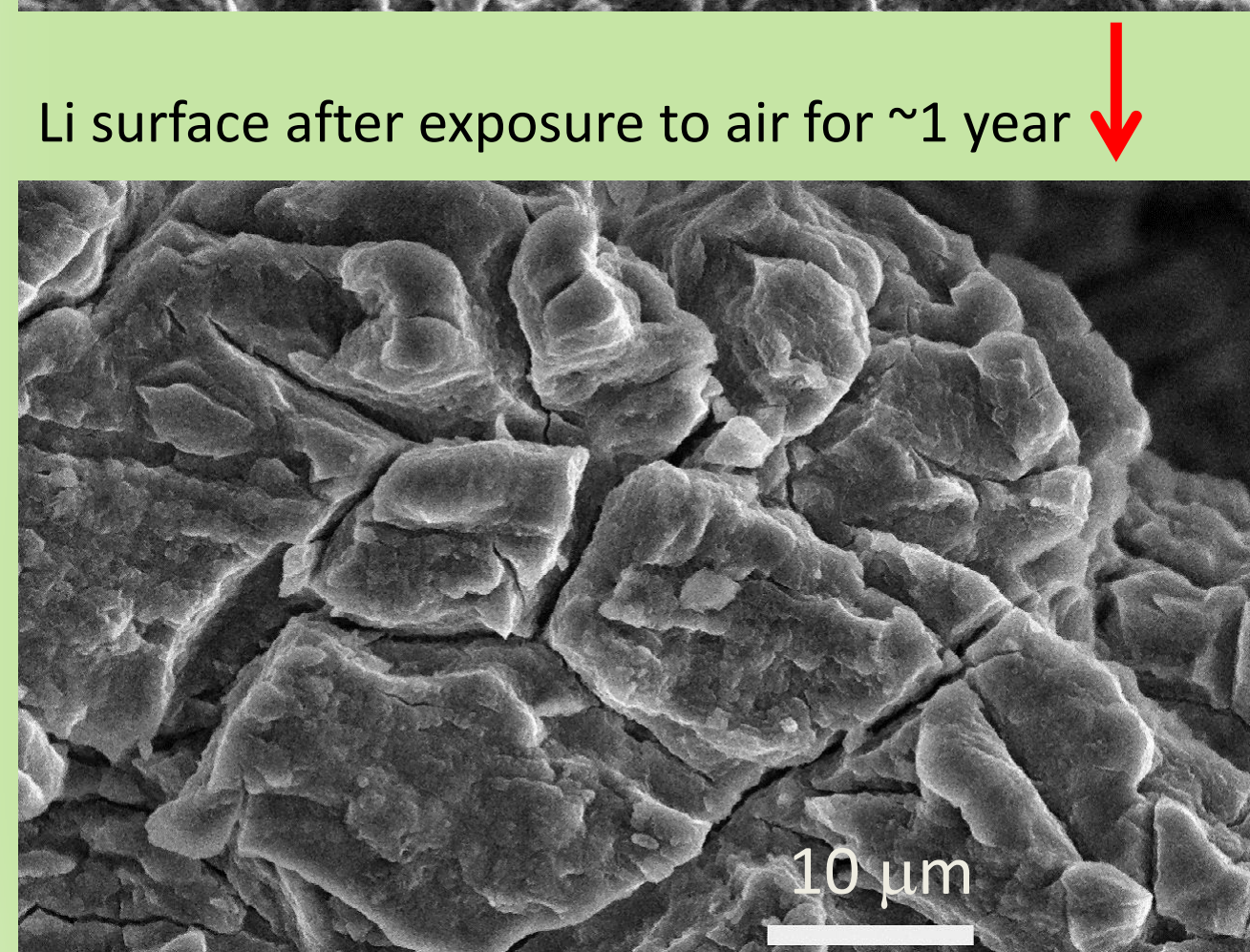
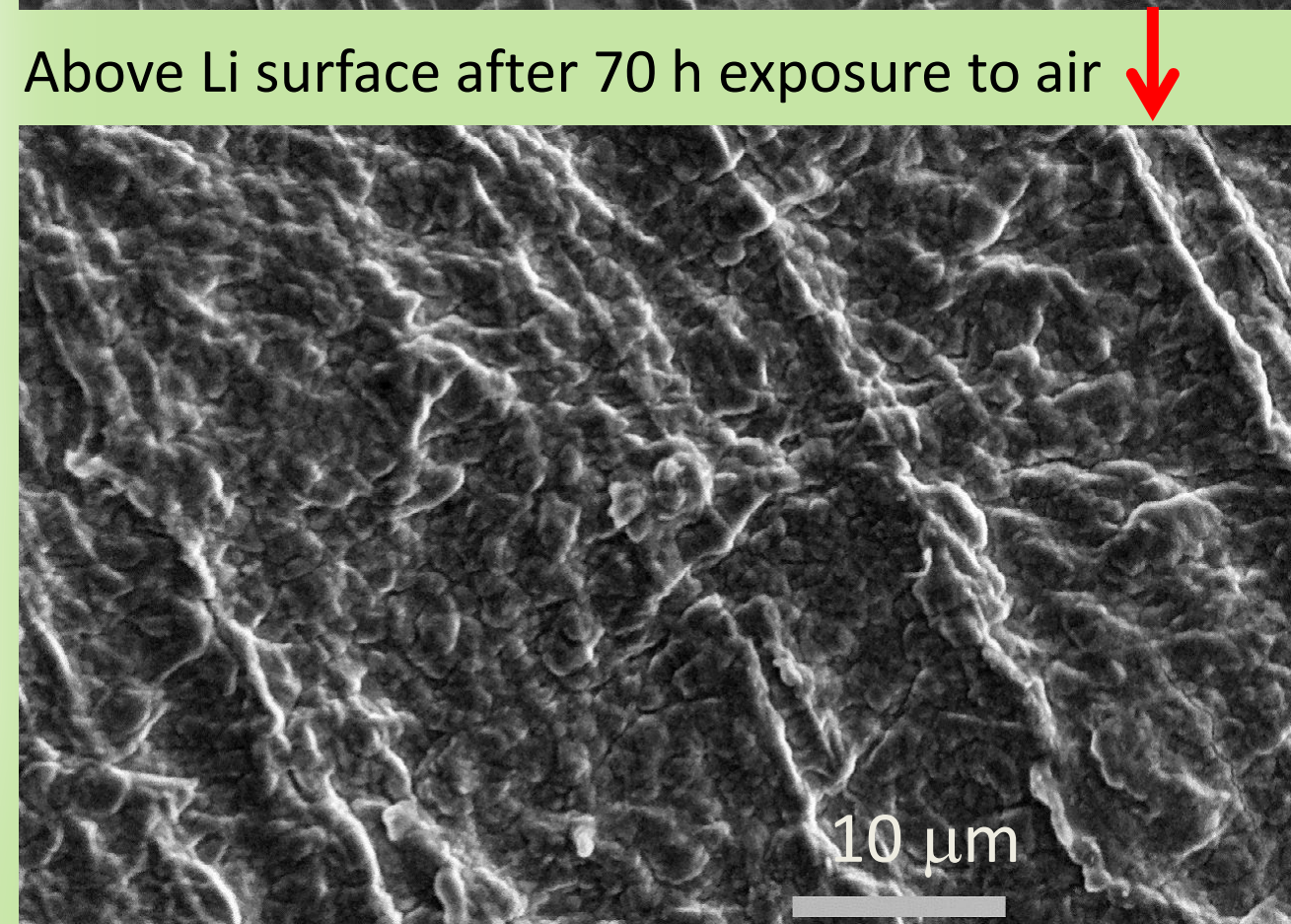
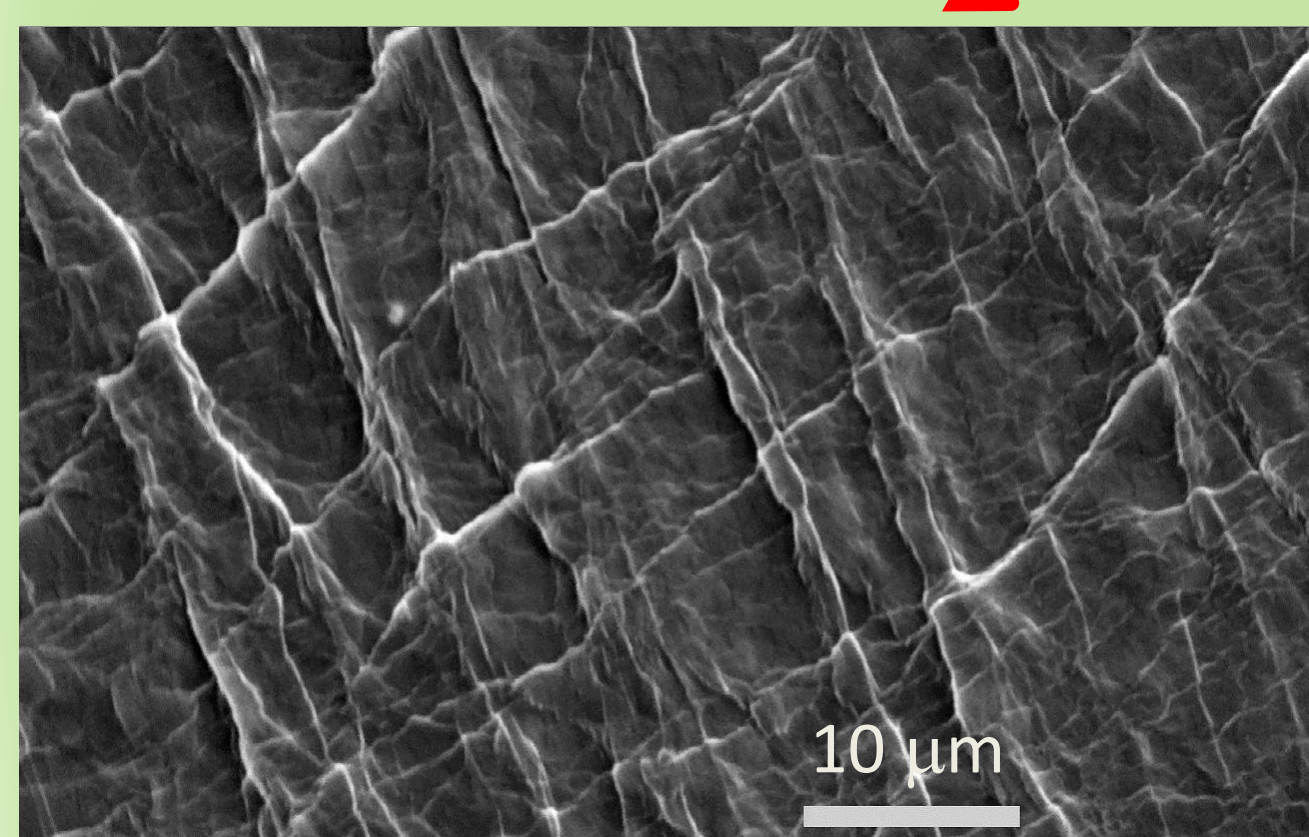
from the protective atmosphere of a glove box, avoiding air exposure, to a sample chamber of a scanning electron microscope. Thus, we constructed a low cost transportable device. The transportable transfer device holding a small evacuable chamber was constructed from a valve fitted with adapters to a glove box and a scanning electron microscope (JEOL 840). Examples of the application to high energy battery research are illustrated.



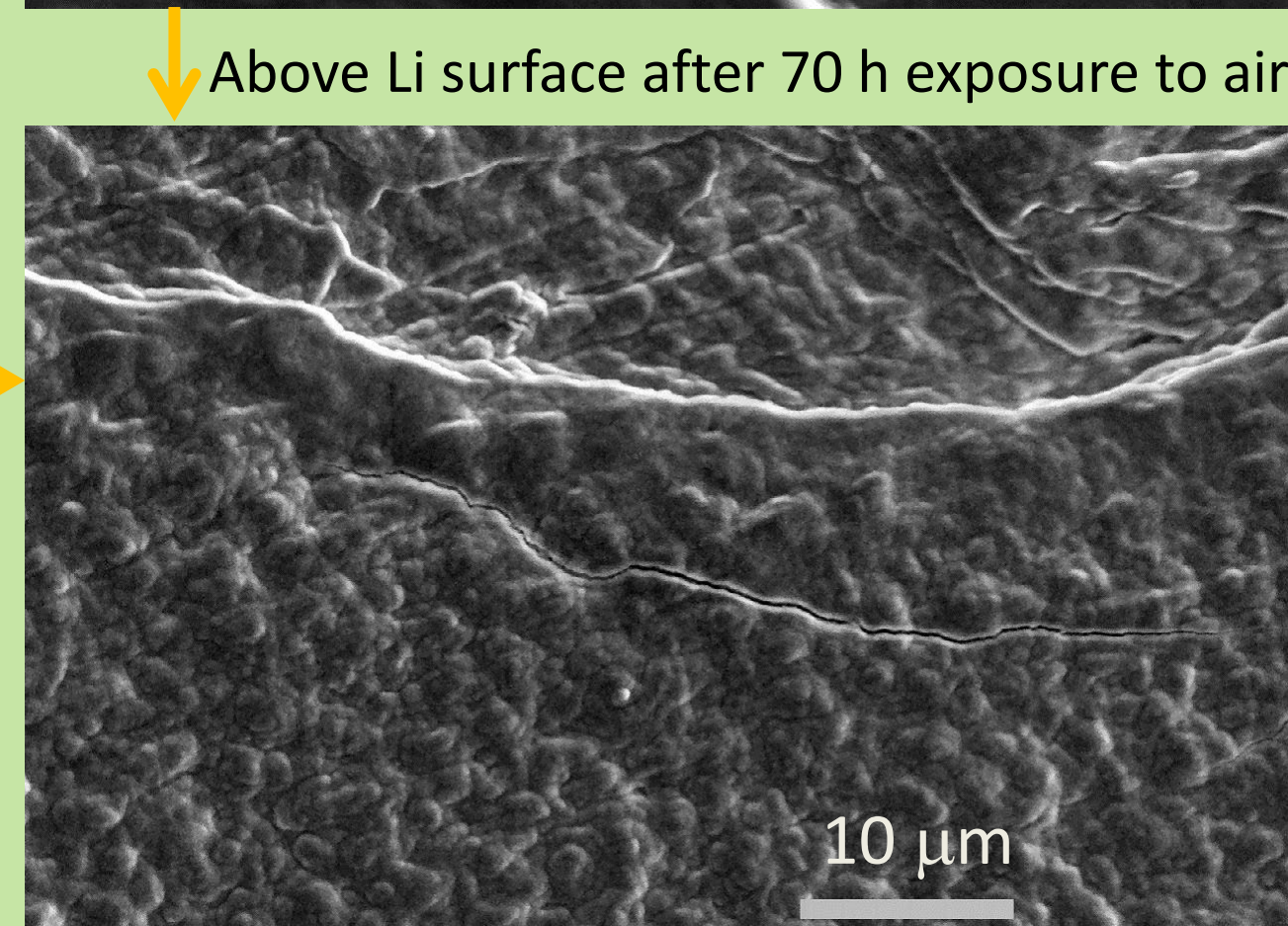
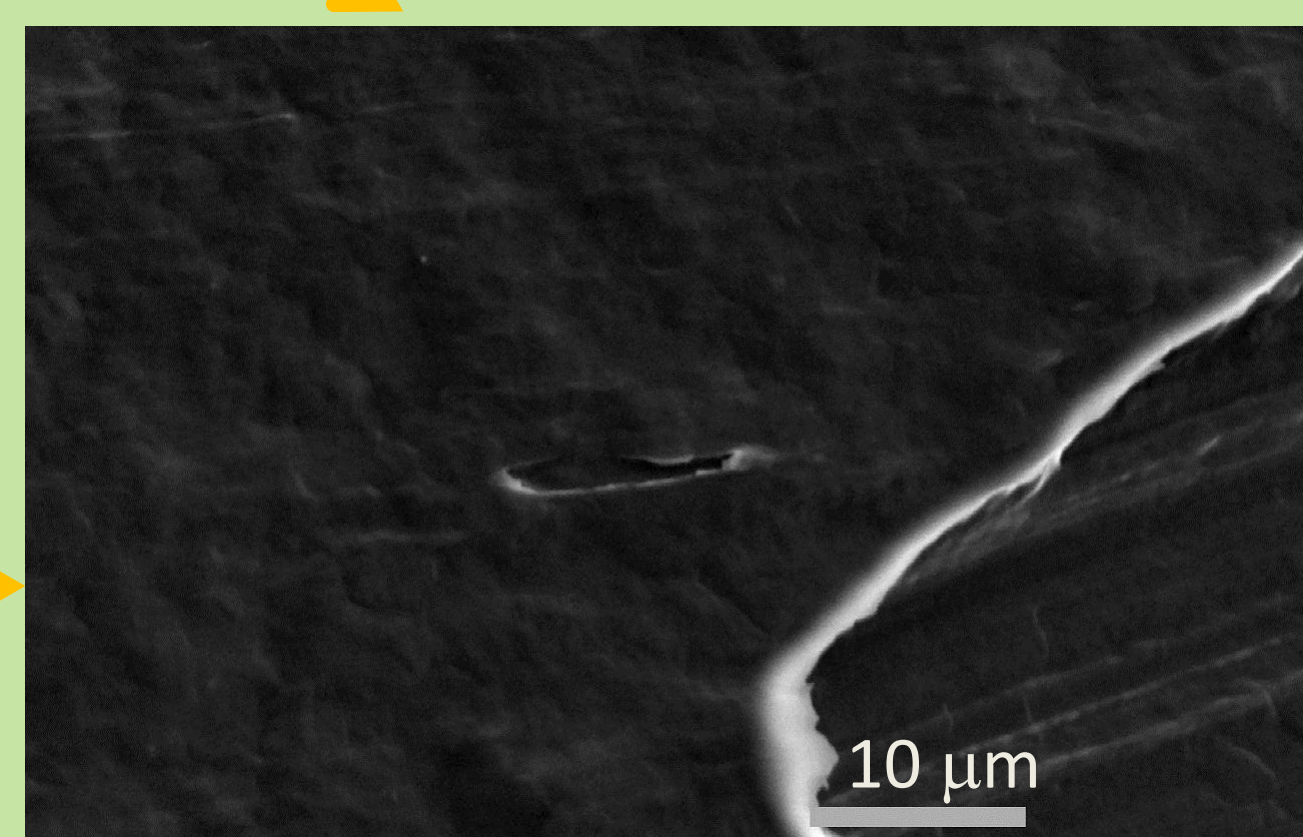
Study of pure lithium

A piece of pure lithium stored under Ar in a glove box, scraped on part of the surface to ensure the existence of a fresh metal surface was transferred to the SEM applying the transportable transference device.

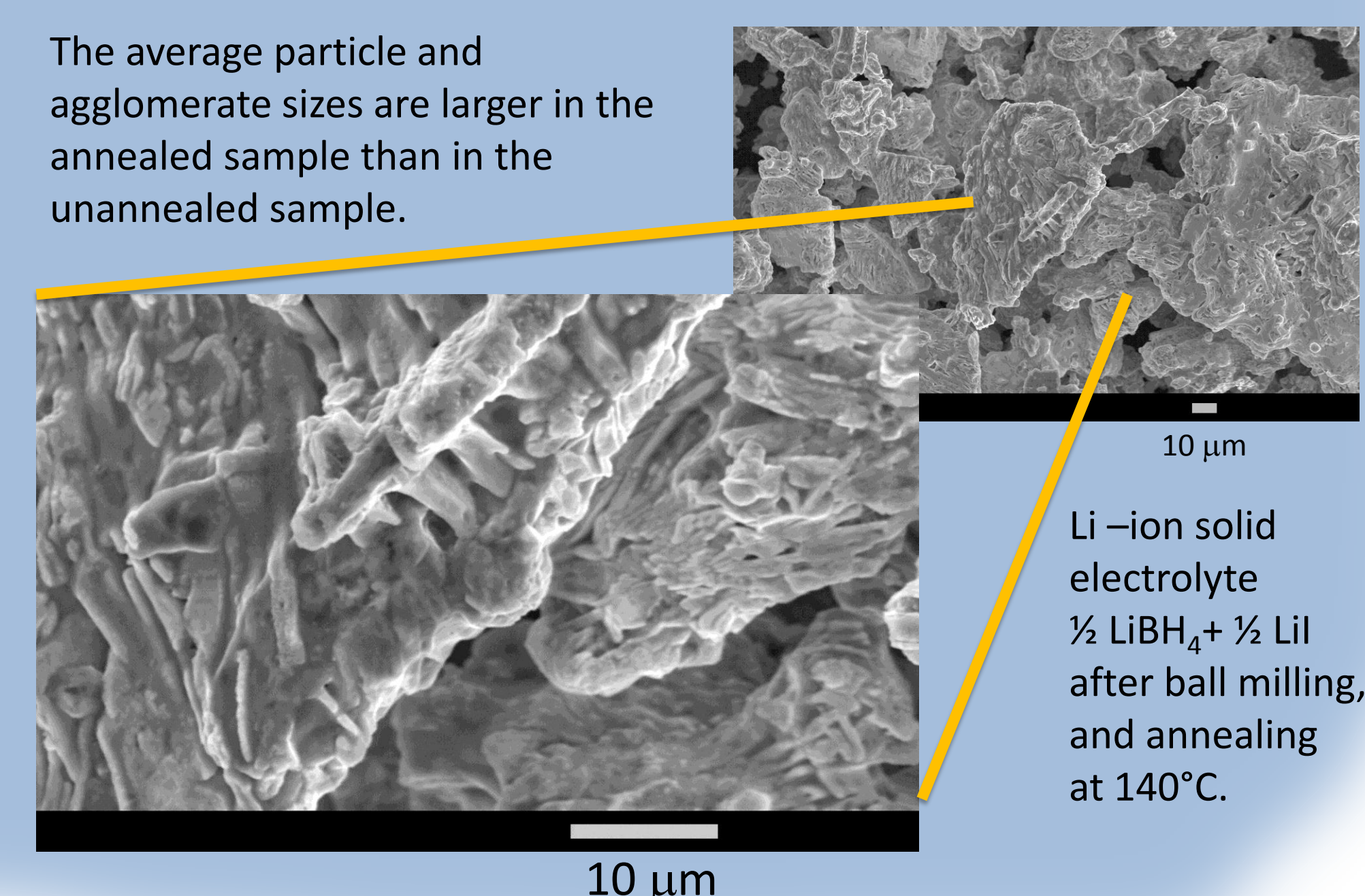
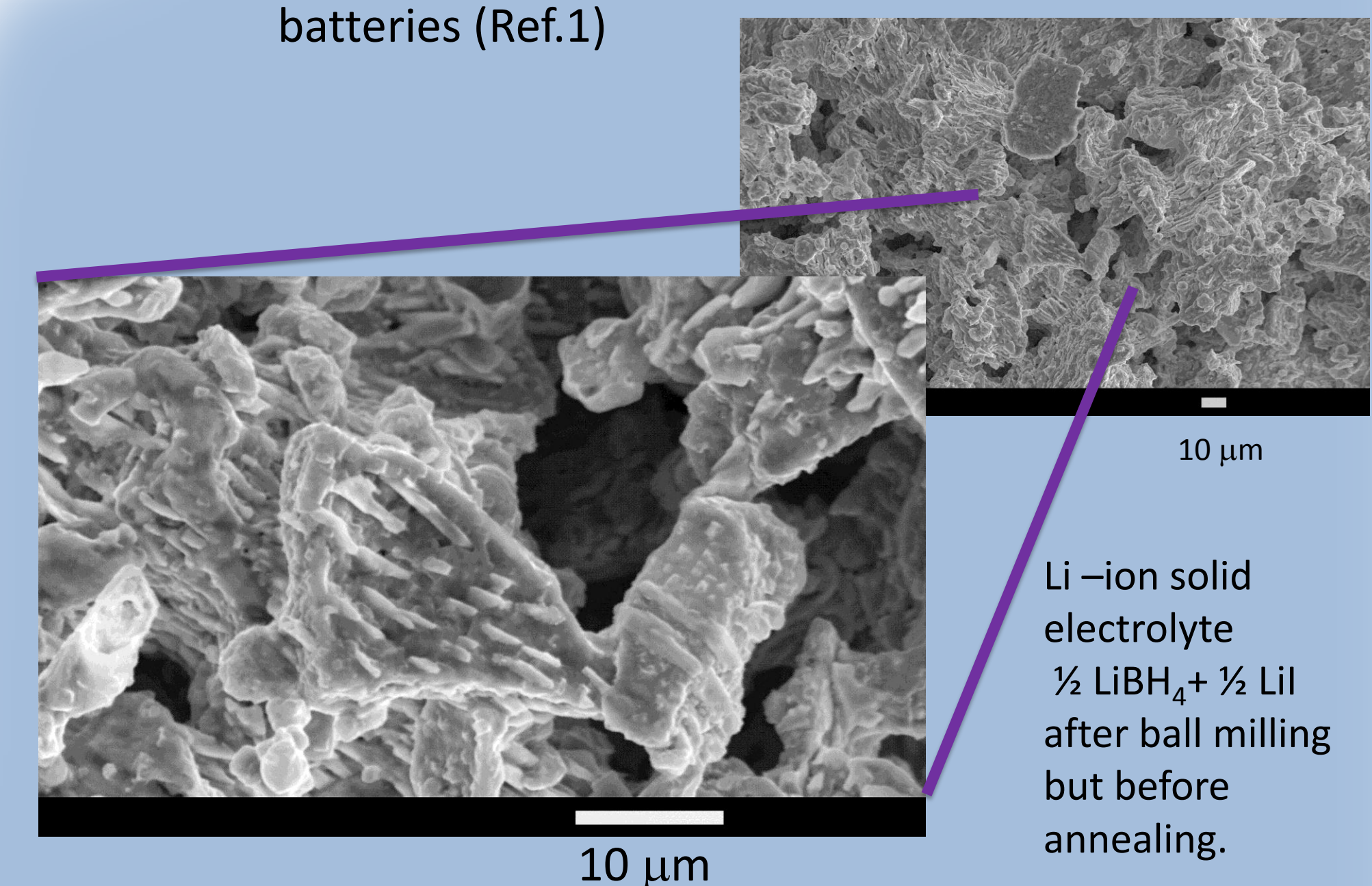
Argon stored Li surface



Scraped Li surface



Study of $\text{LiBH}_4\text{-LiI}$ solid solutions as crystalline electrolyte for all-solid-state lithium based batteries (Ref.1)



The average particle and agglomerate sizes are larger in the annealed sample than in the unannealed sample.

Li-ion solid electrolyte $\frac{1}{2} \text{LiBH}_4 + \frac{1}{2} \text{LiI}$ after ball milling but before annealing.

Li-ion solid electrolyte $\frac{1}{2} \text{LiBH}_4 + \frac{1}{2} \text{LiI}$ after ball milling, and annealing at 140°C.

Reference

1. Dadi Sveinbjörnsson, Jón Steinar Gardarsson Mýrdal, Didier Blanchard, Janet Jonna Bentzen, Takumi Hirata, Mogens Bjerg Mogensen, Poul Norby, Shin-ichi Orimo, and Tejs Vegge, "Effect of Heat Treatment on the Lithium Ion Conduction of the $\text{LiBH}_4\text{-LiI}$ Solid Solution", Journal of Physical Chemistry C 2013, 117, p.3249-3257.

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